Table 1: Example of a method of determination of a pig-pen "PFGE match" and assigning that phenotypic characteristics to a PFGE pattern. This example is for replicate one, pen one, *S. anatum*.

100% PFGE pattern no.	pig	pen	Phenotype assigned to cluster
45	2		No Match
52	**1**	**1**	**PGFE Match**
69		1	No Match

Table 2: *The count of 100% and 90% PFGE patterns and the number of isolates (in brackets) found within each serotype*

	S.Anatum	S.Derby	S.Heidelberg	S. Infantus	S.Typhimurium
100%	32 (70)	33 (82)	6 (12)	6 (12)	14 (46)
90%	7(70)	6 (82)	3 (12)	2 (12)	2 (46)

Table 3: *Frequency distribution of isolates by serotype and PFGE pattern phenotypic behavior. The phenotypic behavior describes that on the same day a 100% homologous PFGE pattern was isolated from pigs at slaughter and from the pen floor prior to the pigs being placed in the pen.*

Phenotype	S.Anatum	S.Derby	S.Heidelberg	S. Infantus	S.Typhimurium
No	43	74	8	12	35
Yes	27	8	4	0	11

O 21 *Salmonella* surveillance trends in porcine Salmonellae in GB: 1996- 2002

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Summary: Comparison of serotype, phagetype prevalence and antimicrobial resistance profiles for 2002 with data from previous years shows an overall decrease in the number of *Salmonella* incidents in pigs. Nonetheless, the most frequently isolated serotypes remain unchanged, with an increase in *S.* Typhimurium incidents. The incidence of antimicrobial resistance for all *Salmonella* isolates from pigs during the study period showed increasing resistance trends to tetracycline and sulphamethoxazole/trimethoprim. However, the isolates remained sensitive to the majority of antibiotics in the screening panel.

Keywords: serotype, phagetype, antimicrobial resistance, human disease.

Introduction : This study describes the surveillance trends for *Salmonella* isolated from pigs in Great Britain over a seven-year period. The current use of in-feed antibiotics for both preventative and therapeutic purposes in livestock production has raised concern in relation to the emergence of antimicrobial resistant *Salmonella* from pigs. Trends for the major *Salmonella* serovars isolated from pigs are also considered. It is currently recognised that the majority of outbreaks during the summer months in England and Wales were primarily due to *Salmonella* infection linked to consumption of pig meat (Smerdon *et al.*, 2001).

Materials and Methods: *Salmonella* isolates: A total of 2112 isolations of *Salmonella* submitted from 2048 recorded incidents, were received from the Veterinary Regional Laboratories in England and Wales during the period 1996-2002, were serotyped using a microtitre method based on the CPHL method (Shipp and Rowe, 1980). These *Salmonella* cultures were tested against 16 antimicrobial compounds.

Sensitivity tests: A disk diffusion technique using Sensitest agar (Oxoid) and antimicrobial containing disks (Oxoid) was used (Wray *et al.*, 1991). The disks contained the following antimicrobials: Amikacin (30µg) AK; Amoxycillin/clavulanic acid (30µg) AMC; Ampicillin, A (10µg); Apramycin, APR (15µg); Cefoperazone, CF (30µg); Cefuroxime, CX (30µg); Chloramphenicol, C (10µg); Chlortetracycline, T (10µg); Colistin, CT (25µ) Furazolidone, FR (15µg); Gentamicin, G (10µg); Nalidixic Acid, NA (30µg); Neomycin, N (10µg); Streptomycin, S (25µg); Sulphamethoxazole/trimethoprim, TM (25µg); Sulphonamide compounds, S3 (500µg, from 1998 onwards 300_g was used). A growth inhibition zone diameter of less than 13mm was recorded as resistant (Sojka *et al.*, 1972).

Results: *1. Serotype & phagetype prevalence isolated from pigs between 1996 and 2002.*
Salmonella Typhimurium was the most predominant serotype isolated from pigs during the 7 year study period, constituting between 59 % (1996) and 71 % (2002) of incidents. *Salmonella* Derby was found to be the next most commonly isolated serotype, contributing between 7 and 15 % of incidents over the study period. *S.* Kedougou, *S.* Gold coast and *S.* Panama constituted the other major serotypes most prevalent from porcine submissions.

The number of *Salmonella* Typhimurium DT104 incidents during the 7 year study period has decreased successively from 73 % of incidents in 1997 to 13 % in 2002. Interestingly, *S.* Typhimurium U308a has been isolated with increased frequency since 1999. The frequency of incidents attributed to *S.* Typhimurium DT 193 has remained consistent within the study period. Other S.Typhimurium incidents were mainly attributable to, U302, U288 and U308. During 2002, infection with *S.* Enteritidis was very low with only 1 incident of *S.* Enteritidis PT8.

2. Antimicrobial resistance patterns of S.Typhimurium and other serotypes.
Between 1996 and 2002 the majority of *S.* Typhimurium DT104 isolates from pigs showed the recognised resistance pattern AM, C, S, SU, T, with multiple antibiotic resistance (defined as Θ 4 antibiotics in the panel of 16 antibiotics tested) detected in DT104, DT104b, DT120, DT193, DT193a, DT208, DT7, DT12, U288, U302, U308a and U310.

Between 1996 and 2002 there was a marked increase in antimicrobial resistance of *S.* Typhimurium isolated to sulphamethoxazole/trimethoprim, with increasing resistance from 16 % in 1996 to 44 % in 2002. Many of the determinative phagetypes of *S.* Typhimurium isolated from pigs (DT193, DT208, U288, U308a, U310) have been shown to be resistant to sulphamethoxazole/trimethoprim.

The tetracycline resistance prevalence observed for *S.*Typhimurium appears to have sustained a consistently high trend with approximately 95 % of pig isolates being recorded as resistant in 2002. Corresponding resistance patterns to Aprimycin were consistently low whereas a resistance to Nalidixic acid was seen to rise slightly from >1 % in 1996 to 5.6 % in 2002.

The incidence of antimicrobial sensitivity for all *Salmonella* isolates excluding *S.* Typhimurium during the study period showed a rise in antimicrobial resistance However, the isolates in the study were sensitive to the majority of antibiotics in the screening panel. Multiresistant strains of *S.* Newport have not been detected within the study period.

Conclusions: Predominant *Salmonella* serotypes and resistance patterns remained consistent over the 7 year study period. The incidence of antibiotic resistant *S.* Typhimurium in pigs in Great Britain has

been increasing despite a reduction in annual submissions. *S.* Typhimurium U308a has been isolated with increased frequency since 1999. The incidence of antimicrobial resistance for all *Salmonella* isolates from pigs showed increasing resistance trends to tetracycline and sulphamethoxazole/trimethoprim.

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References:

Shipp, C.R. B. Rowe (1980). A mechanised microtechnique for *Salmonella* serotyping. J. Clin Pathology 33, 595-602.

Smerdon, W.J., Adak, G.K., O'Brien, S.J., Gillespie, I.A.,Reacher, M. (2001): General outbreaks of infectious intestinal disease linked with red meat, England and Wales, 1992-1999. Commun Dis Public Health 4, 259-267

Sojka W.J., Slavin, G., Brand, T.F., Davies, G. (1972) A survey of drug resistance in *Salmonella* isolated from animals in England and Wales. British Vet Journal 128: 189-198.

Wray C., Beedell, Y.E., McLaren, I.M. (1991) A survey of antimicrobial resistance in salmonellae isolated from animals in England and Wales during 1984-1987. British Vet Journal 147: 356-369.

O 22 Investigations of potential transfer of *Campylobacter coli* between hogs and turkeys.

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Summary: Hogs are often grown in close proximity to turkey farms in North Cartolina, and the potential exists for transfer of pathogens, including *Campylobacter*, from one host animal to another. The aim of this study was to obtain evidence for possible transfer of *Campylobacter coli* from hogs to turkeys, or vice versa. Strains from four paired hog and turkey farms were isolated and characterized in terms of their antibiotic resistance profiles, and by molecular subtyping utilizing PCR-RFLP of *flaA*. Certain strains were found to be shared between hogs and turkeys, suggesting possible transfer. In spite of identical molecular subtypes, such strains commonly differed in antibiotic resistance profiles. The results are consistent with the hypothesis that strains of *C. coli* may transfer between hogs and turkeys, or that certain strain subtypes may independently colonize these animals through unidentified reservoirs.

Keywords: Strain subtypes, antibiotic resistance, PCR-RFLP, reservoir, prevalence

Introduction: *Campylobacter* spp., especially *Campylobacter jejuni* and *Campylobacter coli*, are recognized as leading bacterial causes of acute human gastroenteritis (Campylobacteriosis). *Campylobacter* is a zoonotic pathogen, which colonizes meat animals (poultry, hogs, cattle and others) and becomes transmitted to humans primarily through meat contaminated during slaughter and processing (Friedman et. al., 2000).
Although various meat animals are known to be commonly colonized by campylobacters, a degree of host adaptation appears to exist. Poultry are most frequently colonized by *C. jejuni*, followed by *C. coli*, whereas cattle and swine are colonized almost exclusively with *C. jejuni* and *C. coli*, respectively (Aarestrup et al., 1997;Saenz et al., 2000; van Looveren et al., 2001). However, circumstantial evidence exists for possible transfers among hosts, and common strain types between *Campylobacter* from broilers and other animals (cattle, swine) have been reported (Aeschbacher and Piffaretti, 1989; Meinersman et al., 1997; On et al., 1998).